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EDITORIAL DEPARTMENT NOTE

The two articles in this issue of the *Bulletin* deal with phases of war production which are becoming of increased importance to industrial accountants. All companies, whether engaged in production on government contracts, or not, have encountered difficulties in scheduling shipments under priority regulations. The procedures adopted by the Caterpillar Tractor Co. in meeting this problem will be of interest to others who are confronted with it. With the expansion of subcontracting, the auditing of the accounts of subcontractors by the accounting staff of the prime contractor becomes an activity of increased importance. The trend of recent years in the growth of internal auditing will be given added impetus with the growth of subcontracting. Our second article deals with the internal auditing procedure necessary to verify and control the accounting records in connection with subcontracts.

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APRIL 1, 1942

SCHEDULING SHIPMENTS UNDER PRIORITY REGULATIONS

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THE PROBLEMS involved in scheduling shipments under priority regulations for Caterpillar Tractor Co. are not unique to that company since they have developed in all war industries. The procedures developed by this company to meet those problems may, therefore, be of interest to other companies.

The company manufactures track-type tractors, diesel engines and motor graders and, in addition, manufactures a substantial volume of replacement parts. The two types of sales present wholly different problems in that the one consists of a low volume of relatively high unit cost sales, whereas the other consists of a relatively high volume of low unit cost sales. This article is concerned only with the problems developed in connection with the scheduling of machine sales.

Former Practice

In the days before the outbreak of hostilities in Europe, the company seldom had a back-log of orders which presented a problem in scheduling deliveries. A bound book was maintained for each machine with one page for each shipping date, and when an order was received it was entered on a page which corresponded as closely as possible to the date shipment was required. The distributor purchaser was then notified of shipment date and, barring unforeseen delays, shipments were made day by day in accordance with the orders entered. Under these more normal conditions, a reasonable inventory of finished machines was maintained at all times and deliveries were made from stock, the only limitation on daily deliveries being that of shipping facilities.

However, with the outbreak of hostilities in Europe, the demand for the company's products skyrocketed and very quickly a back-log of orders of serious dimensions developed. Even before the strict application of priorities in Washington, it became necessary for the company to adopt its own informal priority system so that the available machines could be parcelled out to the uses which ap-

peared most important to the defense program and to the public good. This informal priority system was, of course, rapidly superseded by the priority system established in Washington and in the late fall of 1941 the company reluctantly informed its distributors that it could no longer guarantee acceptance of orders for machines without defense ratings.

Priority Regulation No. 1

Priorities regulation No. 1, as amended, specified as to sequence of deliveries as follows (section 944.7):

"Sequence of Deliveries.—(a) Every delivery under a Defense Order or other rated order shall be made in preference to deliveries under all other contracts or purchase orders whenever, and to the extent, necessary to meet the delivery schedule provided in the preference rating certificate covering such delivery, or in the contract or purchase order if no certificate has been issued. Deliveries bearing no preference rating or lower preference ratings shall be deferred to the extent necessary to assure those deliveries bearing higher preference ratings, even though such deferment may cause defaults under other contracts or purchase orders. Each person who has Defense Orders or other rated orders on hand must so schedule his production and deliveries that deliveries thereunder will be made on the dates required, giving precedence, in case of unavoidable delay, to deliveries bearing the higher preference ratings.

"(b) The sequence of deliveries bearing the same preference rating shall be determined by the delivery dates specified in their respective preference rating certificates, or if the ratings were assigned by rule, regulation or Order of the Director of Priorities, but no certificates were issued, then by the dates specified in the contracts or purchase orders. In any case where both preference ratings and delivery dates are the same, and it is impossible to make all deliveries on schedule, the sequence of deliveries shall be determined by the respective dates on which the preference ratings are applied to the deliveries.

"(c) Notwithstanding the foregoing provisions, Material specifically produced for a Defense Order may not be diverted and delivered under a higher rated order subsequently accepted if such Material is completed at the time of the acceptance of the higher

rated order or is scheduled for completion within fifteen days thereafter, unless such diversion is specifically directed by the Director of Priorities, or unless the subsequently accepted order bears a rating of A.A."

Resulting Problem

A little consideration of the problem of scheduling shipments under such priority regulations will indicate the havoc that these regulations played with the old-time scheduling methods. The normal inventory of finished machines melted away and shipments were made as rapidly as the machines left the assembly lines. Orders entered very neatly on a page for shipment at an early date were soon pushed back by orders received with a higher preference rating. One order received with a high preference rating might push back a thousand with lower ratings and no matter how many holes were left in the schedule for these high rated orders, there never seemed to be enough room. It was obvious that the old system must be discarded as obsolete under such conditions.

The confusion spread also to the distributors. Having advised them of a tentative shipping date for their order, they waited for the machine for weeks beyond that date, knowing only that their order was being pushed back and back on our schedules as higher rated orders were received. A blanket letter advising them of the average back-log on each type machine proved only a temporary stop-gap since it could never cover all priority ratings with any degree of accuracy. Telephone calls from the distributors began to deluge the order division to the point that the manager of the division was spending his daytime hours on the telephone and his nights trying to keep his work going.

Added Data Needed for Purchasing

Concurrent with this problem, another related problem was developing. Priority regulations were rapidly increasing the burden of information required to obtain ratings for the purchase of material. Finally, to meet the problem of "off the shelf" producers such as Caterpillar, the Defense Supplies Rating Plan (later superseded by a somewhat similar Production Requirements Plan) was developed. It is not the purpose of this article to discuss the pro's and con's of the priority regulations. Let us consider at this

time only that this plan required, among other things, analyses of the company's orders received and shipments by preference ratings. It was apparent that a technique for compiling this information rapidly would have to be developed.

Development of Punched Card System

The system, as devised, employs the use of punched cards and tabulating equipment which was in use for general accounting and on other work. In operation it has helped tremendously to alleviate the three problems: (1) scheduling, (2) keeping distributors informed of the schedule, and (3) compiling statistics for priority applications.

A tabulating card was designed with spaces for the following information to be recorded:

1. Customer's order number
2. Company order number
3. Customer's name and code number
4. Type model ordered (recorded by code)
5. Preference rating
6. Date order accepted
7. Date shipment required

It will be noted that no provision was made for recording quantities ordered. Instead, a separate card is prepared for each machine ordered.

When an order is accepted, the order division writes on a card the required information, one card for each machine ordered. These cards are forwarded to the tabulating division where all the information (except date shipment required) is punched in the card. The cards are then returned to the order division.

The order division maintains a separate schedule file for each model machine. This file consists of an index card for each shipping day as far in the future as necessary. Behind each index card are filed originally as many blank cards as the production capacity for each model. That is, if the capacity for a certain model is, say, 20 a day, the file starts with an index card for each shipping day with 20 blank cards behind each index card.

As the tabulating cards are returned to the order division by the tabulating department, the orders which these cards represent

are scheduled for shipment by filing the cards in the scheduling file. At the same time blank cards are removed and, if necessary, the cards representing other orders are rearranged to bring the scheduling file into exact agreement with priority regulations. This method of scheduling has proved to be a decided improvement over the method it superseded.

Weekly Reports

The second problem is getting notification to the customers of the place their orders occupy on the schedule. This is accomplished in the form of a report weekly.

Once a week the schedule files are delivered to the tabulating department. The index card for each day in the files have been punched previously with that date so that in one operation all cards in the file are reproduced and simultaneously the date is punched in the reproduced cards. It will be noted that this date is the date for which each order is currently scheduled for shipment. The reproduced card, therefore, has the following information punched in it:

1. Customer's order number
2. Company order number
3. Customer's code number
4. Code representing type of machine ordered
5. Preference rating
6. Date order accepted
7. Date shipment required
8. Date order is currently scheduled for shipment

As soon as the cards in the scheduling file have been reproduced, they are returned to the order division.

The reproduced cards are, of course, in the same order as the scheduling files: that is, in order by models by shipment date. They are first retained in that order and are mechanically listed by use of the tabulator. All the information punched in the cards is shown on this list which serves as a ready reference for management and the order division and also permanently records the status of the scheduling files as of that date.

Reports for Customers

The cards are next mechanically sorted by customer's code number so that a deck of cards is created for each customer, the cards in these decks being in order by models by date scheduled for shipment. These decks are then listed on the tabulator printing the following information:

1. Customer's order number
2. Company's order number
3. Customer's code number
4. Code representing type of machine ordered
5. Preference rating
6. Date order is currently scheduled for shipment

This listing is printed on a form which contains the following statement in its heading:

> "This is a list of the tentative shipping dates presently assigned to your accepted orders on hand that are scheduled for shipment. It is mandatory that shipments be made in accordance with preference ratings and it is possible, therefore, that the tentative shipping dates outlined herein will be changed because of incoming orders carrying higher preference ratings."

On the reverse side of the form is printed the explanation of the code used for the various models. Four copies of the form are made: the original for the customer, one copy for the order division, one copy for the treasury department and one copy for the sales department. This form, mailed once a week on the day following the day the scheduling files were reproduced, effectively alleviates the problem of keeping our customers informed of the status of their orders in the schedule.

Data Needed for Priority Applications

The final problem is the compilation of statistics for priority applications under the Defense Supplies Rating Plan originally and more recently under the Production Requirements Plan. The information on orders and sales required for these plans and for management consideration of the progress of the company under

these plans has crystallized into three compilations: first, the totals of orders on hand by models by preference ratings; second, the totals of shipments by models by preference ratings; and finally the totals of accepted orders by models by preference ratings. The method of compiling each of these sets of statistics will be discussed in order.

Orders on Hand

Orders have never been priced until shipped and billed and it seemed unnecessary and inadvisable to undertake that task at this time. Orders for the same model vary in price only due to special attachments which are usually relatively unimportant in sales price and it was, therefore, thought that the dollar value of orders could be determined with reasonable accuracy by obtaining counts of orders by models and multiplying these counts by the relative standard sales price for each model.

It has been previously mentioned that as orders were received a separate tabulating card was prepared for each machine and that at each week-end the cards representing orders on hand were reproduced. On the week-end just prior to the end of the month, the statements prepared for the customers are postponed so that there are on hand, after the customer's statements have been prepared, a stack of cards representing the orders on hand at the month end. These cards are then sorted by models by preference ratings and mechanical counts of cards are obtained for each model for each preference rating. These counts multiplied by the standard sales price for each model give the required statistics for orders on hand.

Shipments

As shipments are made the scheduling cards are, of course, removed from the scheduling files. These cards are then passed to the invoicing desk where the date of shipment and the sales value are written on them. They are then forwarded to the tabulating department where the date of shipment and sales value are punched on the cards. The total of each day's cards is obtained and is agreed with the sales for the day. At the end of the month the cards representing the shipments for the month are sorted by models by preference rating. A tabulation of these groups obtains the required statistics for shipments during the month.

Orders Received

The totals of orders received during the month by models by preference ratings is obtained by combining two sets of statistics. It is recognized that orders received during the month have either been shipped during the month or are still on hand at the end of the month. The first set of statistics is, therefore, the orders received during the month and shipped during the month. These statistics are obtained by sorting on the columns containing date order received the cards representing the shipments during the month. Mechanical counts by models by preference ratings of the cards indicating the orders were received during the month gives the totals of orders received and shipped during the month. The second statistics are obtained by sorting on the columns containing date order received the cards representing orders on hand at the end of the month. Mechanical counts by models by preference ratings of the cards indicating the orders were received during the month gives the total of orders received during the month and still on hand. The two sets of statistics added together and multiplied by the standard price of each model gives the required statistics for orders received during the month.

Results

In actual practice the system described in this article has proved very flexible. This was demonstrated by an additional application made after the system had been inaugurated. It became necessary, in connection with orders for steel, to obtain an analysis of shipments in accordance with groupings by end use of the product: i.e., Army-Navy, lend-lease, export, etc. This was easily accomplished by introducing another coding on the tabulating card and compiling totals of shipments by these codes in a manner similar to the compilation of totals of shipments by preference ratings. If further analyses of orders or shipments become necessary there is considerable room left on the card for more and more codes.

Certain companies compile normal sales statistics by means of tabulating cards. This has been the case with this company for several years. The ideal system would combine the normal sales statistics with the priority statistics explained above so that the

one card could be used for both purposes. Unfortunately the normal sales statistics compiled for this company already used the entire card and it was, therefore, necessary to introduce a new set of cards for scheduling and for the compilation of priority statistics.

SUBCONTRACTING EXPANDS THE INTERNAL AUDIT PROGRAM

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THE EMERGENCY PROGRAM set new goals for industrial production, goals which are being achieved through every means available—the expansion of plant facilities, the creation of new facilities, and the use of idle facilities. Subcontracting is affording to an increasing degree a way to realize radically enlarged production quotas. With commendable rapidity, the subcontractor is becoming a necessary element in the organization of plant and equipment for meeting the needs of the victory program. In many cases, subcontract agreements were drawn, signed, and operations started almost simultaneously. Revisions of contracts, clarifications of differences and the tuning of production followed at a tremendous pace. The subcontract idea was new to many of those in the driver's seat of industry. Numerous problems of subcontract relationships developed. Notable among the new problems was the accounting setup to record properly a volume of complex transactions far in excess of normal accounting requirements.

The changes in the accounting system to meet the needs of subcontracting raised many new problems in reworking the internal audit program. The internal auditing department is being asked to verify transactions the details of which are not to be found at the prime contractor's location. It is necessary to expand the internal audit program to establish control over the accounting function that has spread to the subcontract plants.

Factory Rearrangements

The cost of rearranging the subcontract plants is an important item that must receive consideration in the agreement. It is necessary in some instances that the prime contractor stand most of this cost. Allowance for this cost is provided for in the subcontract agreements. All of the costs of rearrangements up to the limits set in advance are subsequently billed to the prime contractor either directly or indirectly. It is the practice of the prime contractor to approve the billings for payment subject to audit. The factory rearrangement costs billed, of course, are not to exceed the actual costs incurred. The control over this angle of the billings is placed in the hands of the internal auditing department. If the changeover of the plant is carried out by the subcontractor himself, the audit must cover the service orders on which the cost department assembled the cost of each job. The detail records supporting the service orders must be examined. It is necessary to verify the pricing and extensions of the material requisitions applicable to the costs under audit. The material may represent a special purchase. If so, an examination of the vendor's invoice will be sufficient. The labor time tickets and the payroll rates must be tested to verify the labor cost element in the billings. If overhead is an allowable item in the cost of rearrangements, then a test of the accuracy of the overhead rate used must be made.

The subcontractor may purchase the services of outside vendors for all of his plant rearrangements. If so, the internal audit verification becomes a simplified procedure. The vendor's invoices will be examined in establishing the final approval of the billing charges to be paid by the prime contractor. The actual situation will probably prove to be a combination of the subcontractor's own costs and the purchase of outside services.

Frequently, a clause in the original agreements with subcontractors may state that the factory rearrangement costs are to be billed to the prime contractor after production begins. This may be attained by fixing a flat amount to be billed per unit or there may be a fixed percentage applied to the product billing until a maximum allowance has been billed. This requires a continuous analysis to determine the amount for plant rearrangement included

in each billing so that the auditor of the invoices will know when the maximum figure is reached.

Tooling-up

After the factory rearrangement period of subcontracting has passed, there comes the interim of tooling-up. The subcontract agreement may have called for the prime contractor to furnish all tools peculiar to the manufacture of this new type of product. Many of these tools are purchased direct from outside vendors by the subcontractor and subsequently billed to the prime contractor. To approve these billings, the audit must cover the examination of the vendor's invoices. Duplicate or photostatic copies of these invoices may accompany the billings. This eliminates the necessity of audit at the subcontractor's location. On the other hand the tools may be manufactured by the subcontractor in his own plant. When this occurs, it is necessary to use the auditing procedure described earlier to verify the costs collected on the service orders.

The tool installation costs may also be a factor recoverable in a direct billing to the prime contractor. If so, essentially the same procedure is used to verify the charge. Still another item of cost is the transportation charges on tool shipments. Frequently, this is included in the billings for the cost of the tools. However, the procedure of audit involves a separate step. The invoice of the carrier on file at the place of business of the subcontractor must be examined and identified as applicable to the tools in question.

Product Billing

After the setting-up activities are complete, the manufacturing operations on the product get under way. Shipments from the subcontract plant are directed to the prime contractor, a customer of the prime contractor, another subcontract plant, the army, the navy or some other destination equally disturbing to the prime contractor's Accounting Department. The subcontractor, however, bills the prime contract for all these shipments.

The verification of pricing on the invoices received by the prime contractor is a simple matter when standard billing prices are in use. A comparison of the price on the invoice with the standard price list is all that is necessary. The major problem in approving

these invoices for payment is involved in cases of shipments by the subcontractor direct to the customers of the prime contractor. Certifications of receipt must be obtained from the customer. These certifications of receipt of shipments are not new to the accounting departments of large companies, but the request for a receipt of these certifications occurs in such wholesale quantities that the ordinary procedure of matching them with purchase invoices must be abandoned.

When notice of shipment to a customer is received from a subcontractor, the billing department of the prime contractor must bill the customer. The internal auditing program must cover the billing process in order to determine that all shipments are billed. This is achieved by accounting for all shipping papers at both the subcontract and prime contract locations. The prenumbering of all shipping papers makes this audit more accurate. A continuous verification must be made by which all numbers of open shipping copies are listed from open numbers in the closed file of the shipping and billing papers. This list of open shippers must be checked with the open files of the billing and shipping departments of both the subcontract and prime contract plants. Any missing shipping and billing copies must be investigated separately to determine whether shipment has been made. If so, a further check must be made to determine whether the customer was billed. A test check of the shipping and billing copies in the closed billing department files should be performed to determine that all shipping papers show the invoice number of the billing to the customer.

Direct Purchases

The original subcontract agreements setting up standard cost billing prices for the finished units did not include an escalator clause covering the advance in material cost prices. This clause was unnecessary because the prime contractor agreed to furnish all raw materials to the subcontractor at the standard material price set in the agreement. This method of establishing a supply line of raw materials to the subcontractor's plant proved to be impractical because of the volume of transactions and the relatively slow delivery schedule involved in receiving an order from the subcontractor and transmitting the order to a vendor of the raw materials. Therefore, for the purpose of expediting delivery, the con-

tract was changed to permit the subcontractor to do his own purchasing.

Two new problems are confronted immediately. The subcontractor must be compensated for his direct purchasing costs and he must receive credit for material cost prices in excess of the standard material price. The first problem may be settled by allowing a fixed percentage of the standard material price as compensation for all direct purchases. The second problem may be disposed of by permitting the subcontractor to bill the prime contractor for all charges for raw material in excess of the standard material price and credit the prime contractor for all charges under the standard material price. The subcontractor's billings for both of these allowances are usually accompanied by a long detailed schedule of direct purchases of raw materials. The amount of the allowance for direct purchasing cost is computed by multiplying the fixed percentage by the standard material cost of all items purchased. The invoice is approved for payment subject to audit of the vendor's original invoices at the subcontractor's location. The billing of the allowance for variation in direct purchase price over and under the standard price is approved for payment in a similar manner.

At the time of the regular audit of the subcontractor, the detailed list of charges attached to each invoice covering the direct purchases is compared with the outside vendor's invoices for two reasons. The first is to see that the raw material purchased is of the type and description shown on the standard material price list. The second is to see that the amount of the invoice agrees with the figures used in the schedule to compute the charges for price variations from standard. This audit may be limited to a substantial test check of the direct purchase invoices in view of the large quantity involved. The location of the audit may be the prime contractor's plant if duplicate invoices or photostatic copies accompany the billing.

The Escalator Clause

If the subcontract agreement calls for billing at a predetermined standard price per unit of product, then there must be some allowance for increases in certain elements of the manufacturing cost. First let us consider material. If the contract states that the raw

material is to be supplied by the prime contractor at a standard-material price, then an escalator clause applicable to material is not required. On the other hand, if the subcontractor supplies the raw material necessary for production, then an escalator clause is necessary in order to allow for increases in material prices. This involves the selection of a measuring stick for the purpose of determining when allowable increases have occurred. This measuring stick may be a commodity price index. When an increase, as shown by this index, has occurred a rate of increase should be computed. The rate then may be applied to the established standard material price, in order to arrive at the amount of the billing for increases in material prices above the basic standard price.

Next let us consider manufacturing expense. Since a burden rate is applied to the direct labor cost, the manufacturing expenses are affected by changes in the direct labor. Hence, to allow an adjustment of direct labor automatically permits an adjustment of manufacturing expense. Therefore, we may dismiss manufacturing expense from direct coverage in the escalator clause. That leaves for consideration only the elements of direct labor cost.

The procedure outlined in subcontract agreements in giving effect to the increasing labor rates varies. In some instances, an average base wage rate for direct labor at the subcontract plant is computed. This base rate becomes effective at the inception of the contract and becomes the basis of all wage rate adjustments under the escalator clause. In order to avert unnecessary clerical details and paper work, a minimum recognized variation may be stated in the subcontract agreement. For instance, variations of less than 3 per cent may be ignored as far as billing adjustments are concerned. At the conclusion of a month's operations, if the computations of the average direct labor rate shows an increase of 3 per cent or over, an adjustment of the month's billings will be made. The total direct labor element in product billing for the month will be increased by the amount of the base rate billing adjustment. The approval of this billing for payment is made subject to audit. At the time of the regular scheduled audit of the subcontractor, a check of the labor rate increase will be made. The basis of computing it must be reviewed and a test check made of the detail going into the direct labor cost. Also a test check of

the detail supporting the total of the direct labor hours must be made.

Verifying the Computation of the Base Rate Adjustment

The procedure used in computing the base rate billing adjustment will determine in a measure the procedure used in verifying the adjustment. One method is described as follows. First compute the current average productive labor rate which may be, for example, 86¢ per hour. Deduct the average productive labor base rate of 80¢ per hour, as shown in the contract, from the current average productive labor rate of 86¢, to find the amount of the increase in rate of 6¢ per hour. Divide the amount of the increase, 6¢, by the average base rate of 80¢ to find the percentage of increase which is 7½ per cent. The 7½ per cent represents the rate of increase in labor cost over the basic labor costs billed during the month. If the direct labor element in product billings during the month amounted to $100,000, then 7½ per cent of $100,000 or $7,500 is the amount of the base rate billing adjustment on direct labor during the month. An additional amount will be billed to cover manufacturing expense. If the standard burden rate is 200 per cent, then there will be an amount of $15,000 included in the base rate billing adjustment. Other factors such as profit may be affected in a similar manner.

Another method of computing the base rate billing adjustment is given below. If a general plant wage rate increase of 10¢ per hour is granted by the subcontractor on the first of the month, the computation may be based on the increase. The total productive labor hours of 125,000 for example, is multiplied by the increase of 10¢ per hour to arrive at $12,500, the amount of the increase in direct labor cost due to the rate increase. Assuming the actual productive labor cost for the month is $132,500, then $132,500 less $12,500 gives $120,000, the computed cost of direct labor at the base rate. To compute the base rate adjustment divide $12,500 by $120,000 to give 10.4 per cent as the rate of increase to be applied to the element of direct labor billed during the month. Assume the billings again are $100,000. Then multiply 10.4 per cent by $100,000 to give $10,400, the amount of the base rate billing adjustment for the element of direct labor cost. As before the ad-

justment may include amounts for manufacturing expense and profit.

Since base rate billing adjustments may be anticipated, it becomes necessary that an analysis of the subcontractor's billings be kept, showing the breakdown of the material, labor, burden and profit elements. By use of this analysis the computation of the adjustment becomes comparatively easy.

The contract may state that the base rate billing adjustment is not retroactive but is to be applied to the billings of the subsequent month. If so, a verification of the rate for each month must be made by examining the detail records of the subcontractor. The product billings of each month including the base rate billing adjustment may be approved for payment subject to the audit of the detail supporting the rate computation.

Another manner of analyzing the billings is to keep a record of the units billed. Then multiply the total units of each model billed by the standard billing price for material, labor, manufacturing expense and profit. This will give a breakdown of the amount billed for each element of cost. This may be complicated by the fact that the subcontractor may ship subassemblies and spare parts in addition to finished units. This will greatly increase the number of different items appearing in the billings and would probably necessitate a card file to keep a record of the number of units of each item.

Overtime and Night-Shift Premium

With the advent of the twenty-four-hour production day on emergency materials, the question of overtime premium and night-shift premium increased in importance. Since these two premium charges may be considered abnormal items of cost, it is necessary that some allowance be made to the subcontractor. There are two plans commonly adopted for handling these special charges under the contract agreement. One is to accept billings from the subcontractor for his actual overtime and night premium. A maximum allowance in any one month may be set with some consideration given to the level of production. The other plan follows the policy of a flat sum allowance to the subcontractor. For instance, if a certain level of production is maintained during the month a flat sum of $25,000 will be billed by the subcontractor for over-

time and night-shift premium. The level of production, of course, will be revealed by the number of finished units shipped during the month.

The latter plan requires no auditing procedure for the final approval of billings except to determine that the production of the minimum number of units is attained. The former plan requires a detailed audit of the payroll records to determine that the overtime and night premium billed represents the actual cost for such items during the month.

Of course, the original standard billing price may include an item covering overtime and night premium. If so, no problem concerning these elements is encountered in approving invoices for payment.

Consigned Material

The subcontractor may not be required to purchase the raw materials necessary for his operations. The subcontract agreement may provide that the prime contractor is to furnish all the raw materials for products manufactured by the subcontractor. This means that the raw material will be sent to the subcontractor on a consignment basis. Such an arrangement involves a number of accounting problems not present in other subcontract agreements. Since the subcontractor works on materials belonging to the prime contractor, it is necessary that a spoilage allowance be set at a figure considered reasonable for both parties. It may be assumed that a 5 per cent allowance is to be granted for spoilage in excess of normal quantities required in production. This spoilage should be accounted for periodically by scrap tickets, one copy of which should be sent to the prime contractor.

To keep a perpetual inventory of materials on hand at the subcontract plant involves a great deal of accounting detail. The shipments of raw materials to the subcontractor are additions to the inventory on consignment. The shipments of completed units and the allowance for material spoilage are liquidations or deductions from the inventory on consignment. The liquidations represent the chief problem. As soon as a piece of ⅜-inch steel rod one foot long goes into production it is shaped into a part which is given a part number. Some of the original steel is lost in the production process through grinding, etc. The parts go into assemblies and

the assembled units are shipped. The credits removing the material from the consignment inventory must be made by "exploding" the units shipped by the subcontractor—that is, breaking down each part in each unit to convert it back to the original number of pounds of steel going into its makeup. This becomes a tremendous amount of detail work when we find that some completed units may contain a hundred parts or more. This process of "exploding" each finished unit shipped during the month is an attempt to account for the material on a physical basis in terms of pounds of steel or feet of wire. This procedure of keeping a perpetual inventory may be abandoned for a substitute method of accounting for the material on a value basis. Thus, when a shipment of finished units is received from the subcontractor, a credit is made to the inventory of material on consignment for the amount of the standard material cost in each finished unit.

Use of Physical Inventory

Once each year, at the time of the physical inventory of the prime contractor, a physical inventory should be taken of the material on consignment at the subcontractor's location. The physical inventory should be under the supervision of the prime contractor. Raw material, work in process and finished goods must all be included in the inventory count. However, the pricing of the inventory will be for the material element only. If the procedure of "exploding" the finished units is followed on shipments from the subcontractor, then the same procedure should be used in "exploding" each part or finished unit in the physical inventory before it is priced and extended.

When the value of the material inventory on consignment is computed, it is possible to determine whether any materials spoiled are not accounted for by scrap tickets. If there develops a shortage in inventory, then the amount of the shortage can be determined as follows. The liquidations of consigned materials in finished units shipped and in material spoilage shown by the scrap tickets deducted from the total materials consigned gives the total value of the book inventory. From this remainder deduct the value of the physical inventory. This gives the amount of spoilage not accounted for by scrap tickets. This does not necessarily repre-

sent the amount collectible on account of material spoilage because the total scrap tickets plus unaccounted-for material spoilage may be an amount smaller than the 5 per cent allowance on all materials used. However, if the total of the two is larger than 5 per cent of the material usage, then the excess is collectible from the subcontractor.

Some of the materials consigned may prove to be defective after the manufacturing process has started. Since the material is the property of the prime contractor, the loss because of defective material becomes his responsibility. The subcontractor must be compensated for his loss of labor and burden applied to work on defective material.

In all of the above processes of accounting for consigned material to the subcontractor, the internal auditing department has its function. A check of the liquidations of the material elements in finished units shipped must be made to determine that the balance of the consignment account is currently correct. If all units are "exploded" when credits are to be made to the consigned material account, then a test check of the accuracy of the conversion figures from finished units to raw material must be performed. At the time of the physical inventory of the consigned material, the internal auditing department should check the accuracy of the physical inventory by making test counts, verifying part numbers and reviewing the instructions to those in charge of the physical inventory in each department.

A further complication of the consignment inventory develops when parts and subassemblies manufactured by the prime contractor are shipped on consignment to the subcontractor. This means there is injected into the consignment inventory an element of direct labor and burden. At the physical inventory date a problem of ownership identification enters in and a perpetual inventory record of such parts on consignment must be kept at the subcontractor's plant. After the inventory count has been finished the physical inventory cards must be checked against the perpetual inventory record to determine whether certain parts are manufactured by the prime contractor or the subcontractor. The usual case may be that a number of each of the parts and subassemblies will be found in each classification. The parts identified as manufactured by the prime contractor will be priced as to material, labor

and burden. The remainder of the parts identified as manufactured by the subcontractor will be priced for material content only.

Purchase Contracts

The discussion has been limited to subcontract agreements whereby the subcontractor is entirely removed from the status of an ordinary vendor. The subcontractor discussed here is understood to be one who converts his entire plant, or the major portion of it, into the production of parts and finished units for sale to the prime contractor. There are many types of lesser restricted subcontract agreements which may be referred to as nothing more than purchase contracts in which a minimum quantity of a given product is to be supplied. The subcontract agreement of this type usually results in a price quotation by the vendor and an acceptance or rejection by the vendee.

Partial Subcontract Operations

If the subcontract plant is devoting only a portion of its plant facilities to the subcontract work the execution of the internal audit program becomes more difficult. When production on other than subcontract work is carried on at the same time, there arises the problem of prorating certain manufacturing costs. Some of the extraneous billings by the subcontractor involve charges for material, labor and burden. Then the method of applying and prorating indirect manufacturing expenses between subcontract operations and other operations becomes important. For instance, if the service departments perform work for both classes of operations, some equitable basis of distributing the service department costs must be agreed upon. This may apply to such costs as heat, general maintenance, plant protection and other expenses that may not be chargeable directly to a productive department.

A similar difficulty may be encountered in verifying allowances for labor rate increases if the direct labor in a productive department applies to both subcontract and other operations. Consideration must be given to the control over the charging of direct labor to each class of production. The test verification must cover both the direct labor hours and the direct labor cost.

Conclusion

Some of the problems confronting the accounting department in carrying out the details of the paper work relative to subcontracting have been mentioned. Also, there has been a discussion of the internal auditing procedure necessary for verifying and controlling the accounting process. It appears reasonable to expect that the accounting problems will increase with the production activity of the subcontract plants as they approach their peak production periods. The internal auditing program, therefore, must become increasingly more flexible in its adaptability to fulfill the requirements of these new and changing conditions.

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